UM1032
User manual

STEVAL-ILM001V1 hardware module for the STM8S-DISCOVERY interface for DALI communication

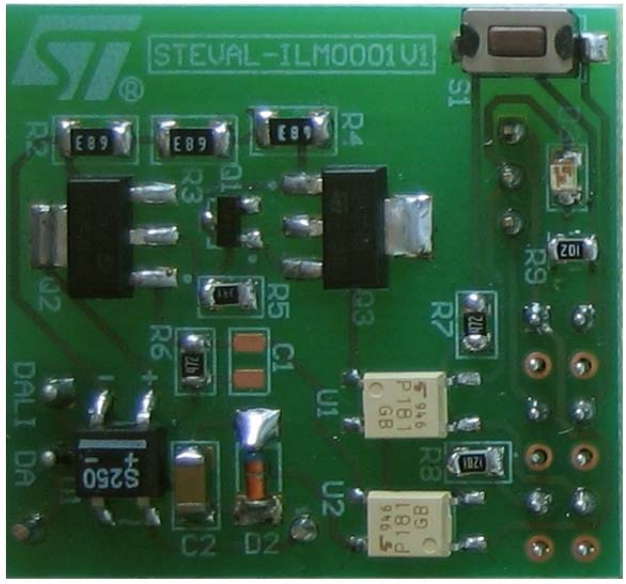
1 Introduction

The DALI (Digital Addressable Lighting Interface) standard is a communication protocol widely used in intelligent lighting applications. Its use is not limited to fluorescent tube lamp dimmable ballasts, for which it was initially designed, but also for future LED applications.

This user manual provides a description of how to use the STEVAL-ILM001V1 plug-in module in conjunction with the STM8S-DISCOVERY kit [see *Section 3*, *3*] and SW DALI library [*Section 3*, *2*], to create a fully working DALI slave application. The application can then be connected to and controlled by any DALI network.

The user is expected to be familiar with the DALI standard and its details as a full description is beyond the scope of this document.

Figure 1. Board top side



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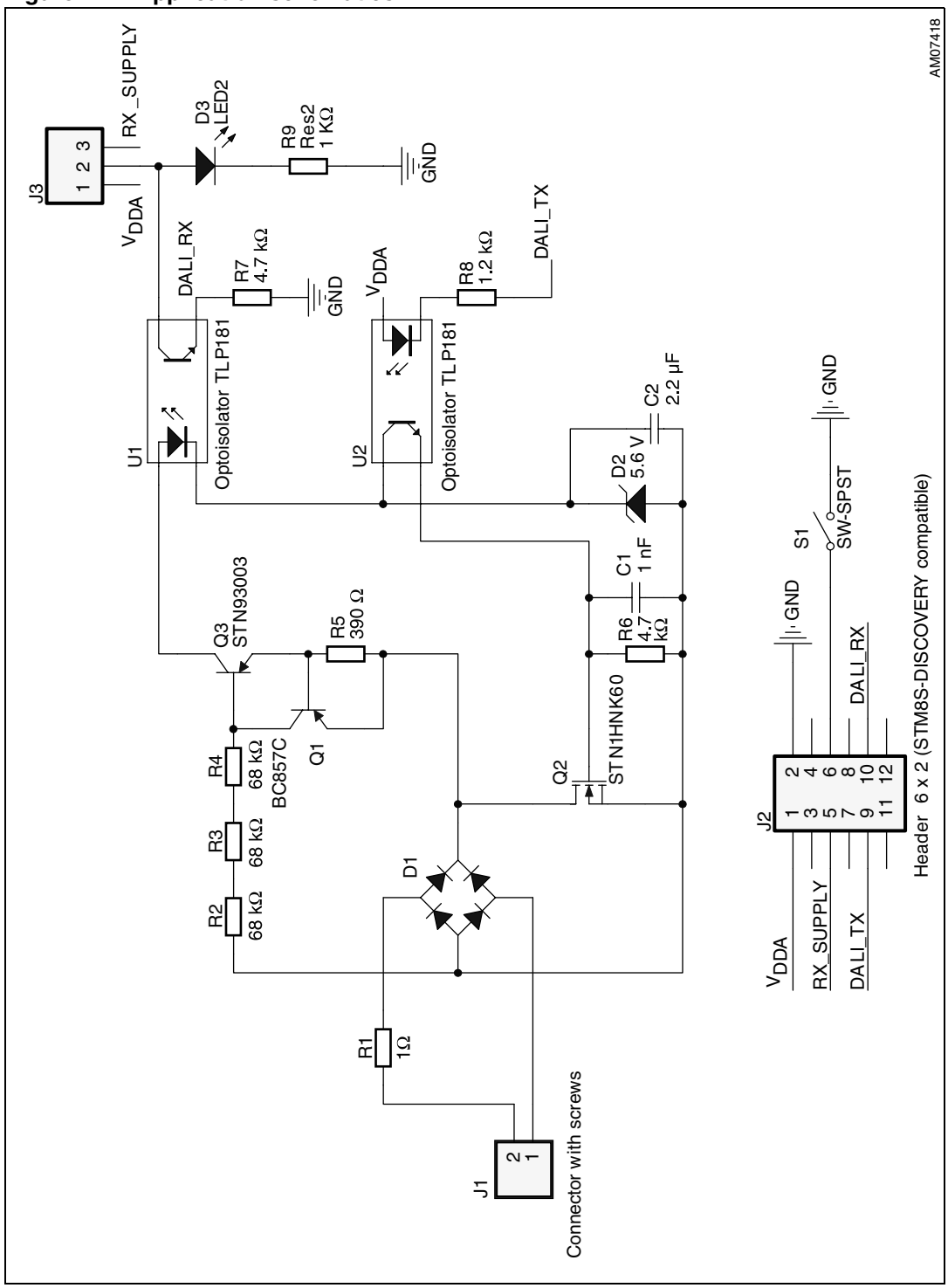
2 Application description

2.1 Hardware required

- STM8S-DISCOVERY: works as a motherboard for the module. The USB is enough to power the whole board including the module.
- STEVAL-ILM001V1: DALI physical interface board (see *Section 3*, *6*).
- DALI network: any network with a DALI master may be used for evaluation (e.g. DALI MCU from Osram [see *Section 3*, *5*] or the ST7DALI-EVAL kit [see *Section 3*, *3*]).

2.2 Application schematics

Figure 2. Application schematics



2.3 PCB description

The module has been designed as a single-layer PCB.

Figure 3. PCB layout - bottom side

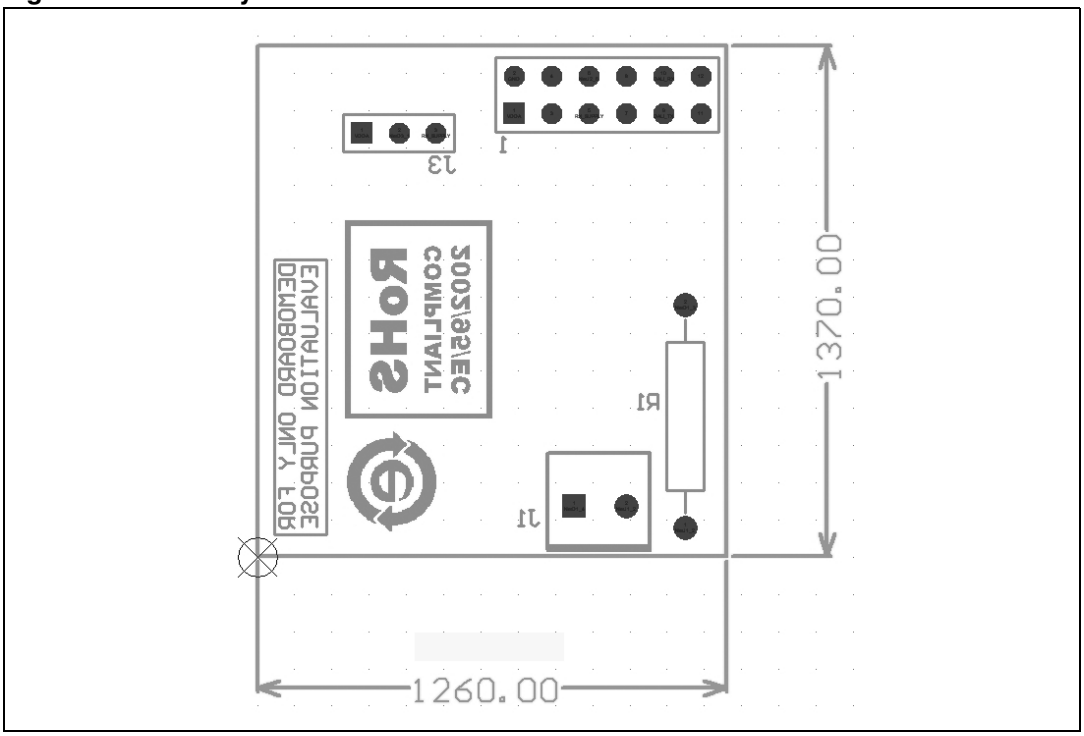


Figure 4. PCB layout - top side

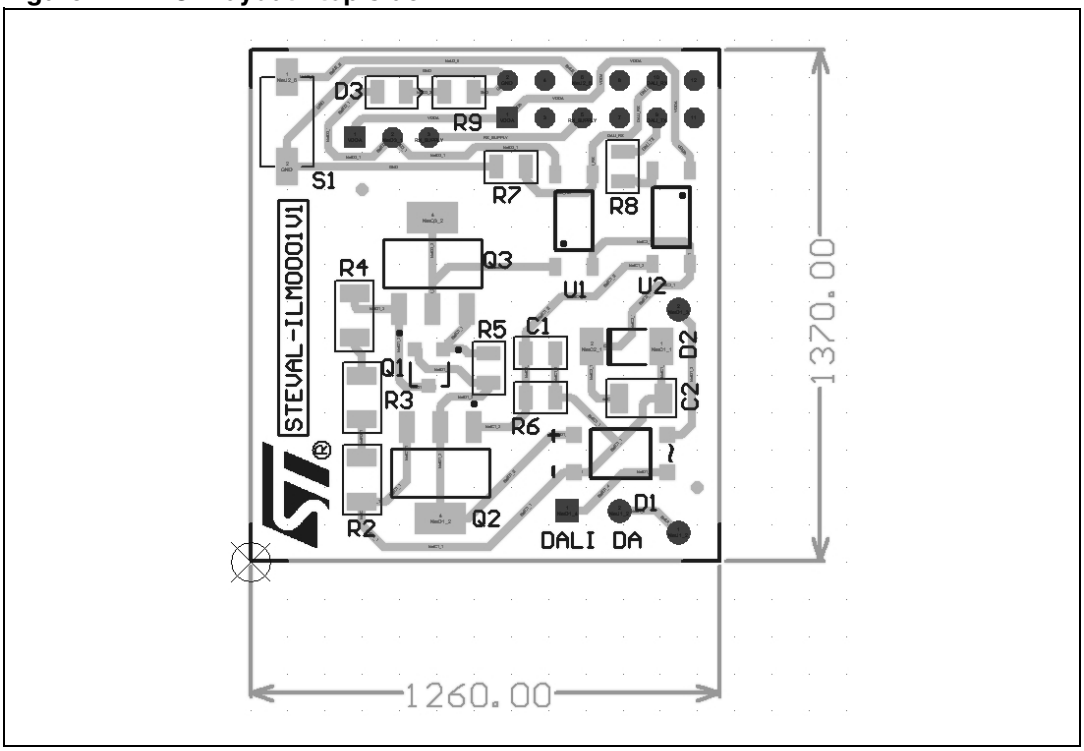


Table 1. Bill of materials

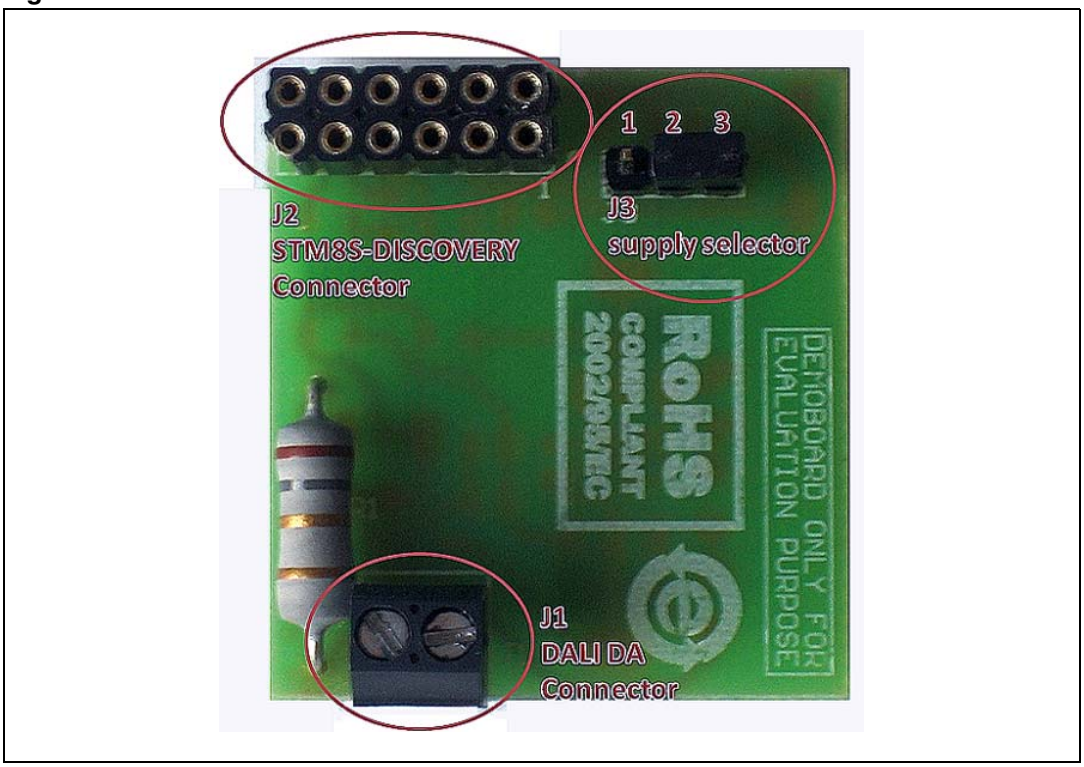
Designator	Value	Footprint	Description	Supplier	Supplier order code
C1	N/A	SMD 0805	Capacitor		
C2	2.2 µF	SMD 1206	Capacitor	AVX	12063C225KAT2A
D1		MiniDIL	Full wave diode bridge		
D2		MELF	Zener diode		
D3		SMD 0805	Green		
J1		ARK550/2	Header, 2-pin		
J2		HDR2X6	Header, 6-pin, dual row		
J3		HDR1X3	Header, 3-pin		
Q1		SOT-23B	PNP bipolar transistor		
Q2		SOT223	N-channel MOSFET	STMicroelectronics™	STN1HNK60
Q3		SOT223	PNP bipolar transistor	STMicroelectronics	STN93003
R1	1 Ω	AXIAL-0.6	Resistor		
R2, R3, R4	68 kΩ	SMD 1206	Resistor		
R5	390 Ω	SMD 0805	Resistor		
R6, R7	4.7 kΩ	SMD 0805	Resistor		
R8, R9	1.2 kΩ	SMD 0805	Resistor		
S1		SMD button	Single-pole, single-throw switch		
U1, U2		MFSOP6-4-pin	4-pin phototransistor optocoupler		
N/A		N/A	Jumper (connected on J3)		

2.4 Application setup

To run the application:

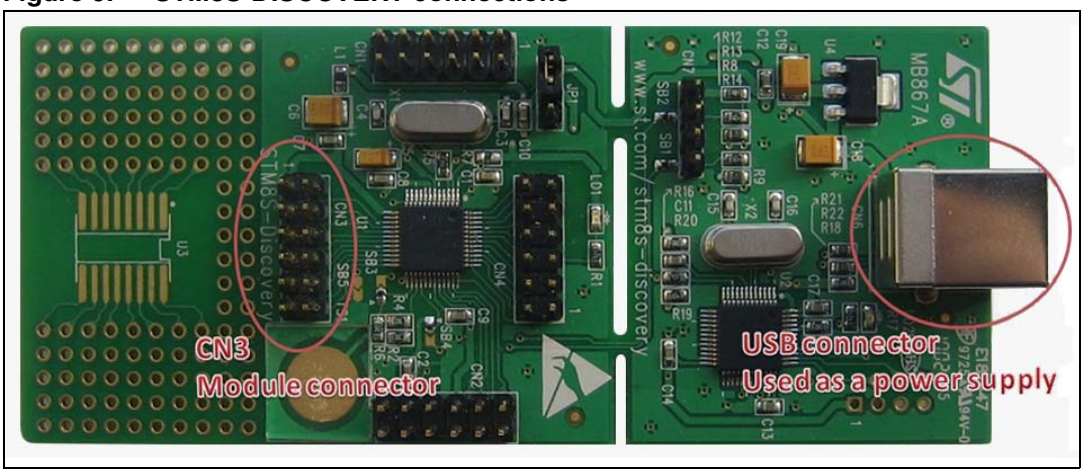
1. Preload the program into the STM8S-DISCOVERY kit (details in the DALI SW library description [see *Section 3*, *2*]).
2. Select jumper J3.
   a) 1-2 shorted, the direct power supply is selected. It means the module is always supplied with the same supply voltage as a controlling microcontroller (on STM8S-DISCOVERY kit).
   b) 2-3 shorted, a controlled supply is selected. The module is supplied through the GPIO pin of the microcontroller, allowing to disconnect the receiver optocoupler when not needed (e.g. during transmission) to lower the overall system consumption.
3. Connect the DALI network cable on connector J1 (DALI DA). There is no need to pay particular attention to wire polarity as there is an input diode bridge on the module.
4. Connect module to the STM8S-DISCOVERY (J2 to CN3).

Figure 5. Bottom side connectors



5. Connect the STM8S-DISCOVERY to any USB (no SW or driver installation required, it is used only as the supply for basic evaluation).

Figure 6. STM8S-DISCOVERY connections



6. The kit is now ready for operation (two LEDs should be ON, one on the STEVAL-ILM001V1 and one on the STM8S-DISCOVERY).

Figure 7. Completed board

2.5 Application description

The completed board (STM8S-DISCOVERY + STEVAL-ILM001V1) works as a DALI slave device. The LD1 on the STM8S-DISCOVERY kit is used as a light source. Its brightness, fade-in/out times, etc., as defined by the DALI standard, can be controlled through DALI to simulate a normal lamp behavior.

The STEVAL-ILM001V1 provides all the functions required by the DALI standards. The most important of which are:

- Level translation from DALI voltage levels (-6.5 to 22.5 V) to microcontroller levels (3.3 V / 5 V logic)
- Proper rise/fall times for the communication
- Current consumption limit (2 mA max.)
- Overvoltage protection for misconnection of rated mains voltage to DALI DA connectors.

2.6 Software description

The software library and examples are described in the AN3298 application note.

3 References

1. www.dali-ag.org
2. AN3298 application note
3. ST7DALI evaluation kit
4. UM0817 user manual
5. DALI MCU - Digital rotary dimmer (http://www.osram.com/osram_com/Professionals/LMS/Products/Scenes/DALI_MCU/index.html)
6. STEVAL-ILM001V1 data brief

4 Revision history

Table 2. Document revision history

Date	Revision	Changes
19-Apr-2011	1	Initial release.

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